

What is claimed is:

- 1                   1. A method of operating a service network connected to an  
2   access network infrastructure shared with other service networks, comprising the  
3   steps of:  
4                   receiving, at a tunneling endpoint in the service network, an  
5   encapsulated packet from an access network device connected to the access  
6   network infrastructure and related to services offered by the service network;  
7                   de-encapsulating the packet;  
8                   if the access network device is associated with an authorized  
9   subscriber to services offered by the service network, forwarding the packet to a  
10   destination network address indicated in the packet. thereby effectuating the  
11   services offered by the service network.
- 1                   2. The invention of claim 1 wherein the tunneling endpoint is a  
2   router and the packet is de-encapsulated using a layer three tunneling technique.
- 1                   3. The invention of claim 2 wherein the layer three tunneling  
2   technique is IP within IP encapsulation.
- 1                   4. The invention of claim 2 wherein the layer three tunneling  
2   technique is minimal IP encapsulation.
- 1                   5. The invention of claim 1 wherein the tunneling endpoint is a  
2   layer two tunneling network server and the packet is de-encapsulated using a layer  
3   two tunneling technique.
- 1                   6. The invention of claim 5 wherein the layer two tunneling  
2   technique is L2TP.
- 1                   7. The invention of claim 1 wherein the service networks utilize  
2   the Internet Protocol and wherein the addresses are Internet Protocol addresses.

1                   8. The invention of claim 1 wherein the service network is  
2                   operated by an Internet Service Provider different from an entity operating the  
3                   access network infrastructure.

1                   9. The invention of claim 8 wherein the service networks are  
2                   operated by different Internet Service Providers.

1                   10. The invention of claim 8 wherein the service networks offer  
2                   access to different Internet Protocol-based services.

1                   11. The invention of claim 1 wherein the access network  
2                   infrastructure comprises a hybrid fiber coaxial network.

1                   12. The invention of claim 1 wherein the tunneling endpoint is one  
2                   of a plurality of tunneling endpoints in the service network, each having a virtual  
3                   interface with a network address, and wherein the encapsulated packet is  
4                   addressed to the network address of the virtual interface.

1                   13. A method of operating a network access device connected to an  
2                   access network infrastructure connected to a plurality of service networks,  
3                   comprising the steps of:  
4                   creating a packet related to services offered by a service network;  
5                   encapsulating the packet and tunneling the packet to a tunneling  
6                   endpoint in the service network so that the tunneling endpoint can de-encapsulate  
7                   the packet and forward the packet to its destination network address thereby  
8                   effectuating the services offered by the service network.

1                   14. The invention of claim 13 wherein the tunneling endpoint is a  
2                   router and the packet is encapsulated using a layer three tunneling technique.

1                   15. The invention of claim 14 wherein the layer three tunneling  
2                   technique is IP within IP encapsulation.

1                   16. The invention of claim 14 wherein the layer three tunneling  
2                   technique is minimal IP encapsulation.

1                   17. The invention of claim 13 wherein the tunneling endpoint is a  
2                   layer two tunneling network server and the packet is encapsulated using a layer  
3                   two tunneling technique.

1                   18. The invention of claim 17 wherein the layer two tunneling  
2                   technique is L2TP.

1                   19. The invention of claim 13 wherein the service networks utilize  
2                   the Internet Protocol and wherein the addresses are Internet Protocol addresses.

1                   20. The invention of claim 13 wherein the service network is  
2                   operated by an Internet Service Provider different from an entity operating the  
3                   access network infrastructure.

1                   21. The invention of claim 20 wherein the service networks are  
2                   operated by different Internet Service Providers.

1                   22. The invention of claim 20 wherein the service networks offer  
2                   access to different Internet Protocol-based services.

1                   23. The invention of claim 13 wherein the access network  
2                   infrastructure comprises a hybrid fiber coaxial network.

1                   24. The invention of claim 13 wherein the tunneling endpoint is  
2                   one of a plurality of tunneling endpoints in the service network, each having a  
3                   virtual interface with a network address, and wherein the encapsulated packet is  
4                   addressed to the network address of the virtual interface.